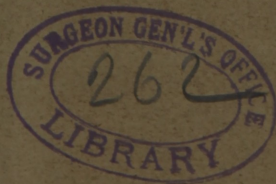


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RECENT PROGRESS
IN
MATERIA MEDICA.

—•—✓
By EDWARD H. CLARKE, M.D.
Professor of Materia Medica in Harvard University.



AN ADDRESS

DELIVERED AT

MASSACHUSETTS MEDICAL COLLEGE

BOSTON

IN THE COURSE OF THE ANNUAL COURSE OF HIGHER EDUCATION

NOV. 1, 1881

BY EDWARD B. FARRAR, M.D.

PROFESSOR OF PHYSIOLOGY

BOSTON

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RECENT PROGRESS IN MATERIA MEDICA.

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AT THE OPENING OF THE MEDICAL LECTURES OF HARVARD UNIVERSITY,

Nov. 2, 1864.

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By EDWARD H. CLARKE, M.D.

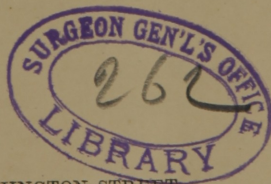
PROFESSOR OF MATERIA MEDICA.

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ADDRESS.

GENTLEMEN—Nothing is more common than to write and talk of the intellectual activity of the present age, and of the supposed or real progress which attends it. Everywhere there are discussion, investigation and change. Nothing is so obscure as to escape observation, or so revered as to be above examination. There is no authority which is not questioned, no claim that is not challenged. The probe of the philosopher or sceptic is pushed fearlessly down to the marrow of all things, regardless of the dismay, or pain, or destruction which attends the operation. English Churchmen call in question the authority of the Bible, and the discussion spreads from the wilds of Cape Town to the cloistered gardens of Oxford; it disturbs the conservatism of the House of Lords and ruffles the equanimity of the Bishops. The third Napoleon reorganizes the map of the world, calls the Holy Alliance a fiction, and proclaims himself the incarnation of progress and order. The Autocrat of Russia abolishes serfdom and hints at constitutional liberty. In our own country, a civil war of unexampled magnitude, and pregnant with unknown results, marks the dying struggles of American slavery. And so, in the sciences and arts, the evidences and results of intellectual activity are not less surprising than in politics and religion. Steamboats and railroads, electric writing and sun-pictures, the microscope and etherization, are not unworthy attendants of the abolition of serfdom and slavery; of the enlightenment of the masses, and of the enfranchisement of thought. Even the quietest fields of study, the obscurest corners of

science are moved by the currents and counter-currents that vex the whole ocean of ideas.

It would be strange indeed, if, in the midst of so much questioning and effort, the science of medicine should be the only one to remain unchanged, the art of medicine, the only one to exhibit a sort of conservative apathy. And, in truth, medicine has *not* stood still. It would not be difficult to show that no science has exhibited greater activity during the last half century than that of medicine, or brought forth greater results in the arts that flow from it.

Perhaps that department of medical science which is supposed to have changed or progressed the least; to be the least susceptible of change; which is often regarded as the narrowest and most barren of all; which is alike the sceptic's jest and the charlatan's resource, is the one which I have the honor to teach in this place—*Materia Medica*. Its name has the hard and forbidding sound of the dead languages. It is supposed to deal with drugs alone, whose jaw-cracking titles are fit symbols of their nauseous taste and disagreeable results; and whose effects, on the human system at least, are thought to be so uncertain or unknown, that the physician who administers them is likened to a gambler, and the patient who takes them to the gambler's victim. The common talk of the unprofessional part of the community on this subject, and sometimes of the professional part, proves that I do not exaggerate this matter. I have heard the assertion, that while all other branches of science have advanced, to a greater or less degree, *materia medica* has stood still. Unless I greatly err, the physician of to-day is often supposed to employ the same means exclusively—emetics, cathartics, alteratives—*ippecac*, oil, *calomel* and *opium*—that his father did fifty years ago. He may administer them in different doses, with diminished frequency, and under different names, but after all, they are the same, "*alter sed idem*." However radical in politics or religion, the regularly educated physician is called conservative in drugs. If he consents to steam, electricity and photography, he sticks to blue pill, the lancet, and the purge. We should infer from the language of some, that science, which has given birth to discoveries not less marvellous than useful, even in medicine, has so far neglected *materia medica* that its resources have not been materially increased, nor its boundaries enlarged; and that, consequently, the therapeutics of the latter half of the nineteenth century are not a great improvement over those of the fifty or hundred years before.

Such, I say, is the notion which the current language of the day not unfrequently implies. If this were true, if this notion were correct, the fact would be most lamentable. But, fortunately, it is not true. *Materia Medica* and its collateral branch, Therapeutics, have advanced, *pari passu*, with other departments of medicine and of science. Its progress may have been, and probably has been, quieter, less observed, less brilliant and less imposing than that of others, but on this account not the less real. The advance of science is often as noiseless and as viewless as that of the electric messenger, who speeds on his way without rustling a leaf or stirring a breath, and yet convulses a nation or changes the markets of a world in his flight.

I invite your attention, then, to-day, to a brief consideration of the progress which has been made in *Materia Medica* and Therapeutics within a comparatively recent period. Such a consideration forms an appropriate introduction to the special course of study, which you will pursue under my direction this winter. It will also serve as an illustration of the progress, which all departments of medicine are making at the present day.

The subject naturally divides itself into three distinct parts: first, a comparison of the present and past boundaries of the *Materia Medica*; secondly, an account of the changes which drugs have undergone; and, lastly, and most important of all, some account of recent progress in ascertaining the physiological action and therapeutic value of remedies. Any one of these divisions would afford ample opportunity for a long discussion—too long for your patience or this occasion. But by grouping them together, and treating them within the limits of a single hour, I can bring before you the prominent differences, the salient points, which distinguish the *Materia Medica* of to-day from that of the past, and which indicate its progress.

Following the order of thought just indicated, let us look first at the former and present boundaries of the *Materia Medica*; at its limits as they were, and as they are; at what it formerly comprehended, and what it now comprehends.

Perhaps the most obvious distinction between the past and present *Materia Medica*, and at the same time the most obvious indication of progress in medicine generally, is to be found in the present signification or interpretation of *Materia Medica*, as compared with

its ancient one. It is undoubtedly true, that the philosophic physician of every age, from Hippocrates till now, has employed food, water, climate and the like in the treatment of disease, and so has included them in his *Materia Medica*. It is equally true that only a minority of physicians have done so. Most physicians, formerly, acted as if the *Materia Medica* comprehended drugs alone, and left all other agents to the charlatan.

If you examine any of the ancient treatises on *Materia Medica*, or those of a comparatively recent period, or even many of those of the present day, you will find them devoted to drugs alone, or very nearly so. The practitioner who made these works his handbooks, had his attention directed to drugs as the sole remedial agents of medical science. Let me give you a single illustration of this. Dr. Murray, of Edinburgh, writing in the early part of the present century, and speaking of remedies, in a treatise devoted to them, says:—"Their natural characters, their sensible qualities, their effects on the living system, and their applications to the treatment of morbid affections, forming so many subjects of description or investigation, constitute the department of *Materia Medica*—understood in the most extensive signification of the term." Now if we examine his work in order to ascertain what was included under the head of remedies, and what was meant by the *Materia Medica* in its most extensive signification, we find that out of 783 pages, 751 are devoted to Pharmacy, Pharmaceutical Chemistry and Drugs, and 32 pages to other agents. The inevitable inference from this is, that so far as Dr. Murray correctly represented the *Materia Medica* of fifty years ago, drugs were the chief, if not the only therapeutical agents, which medical science recognized. He does not give a hint of mental influence, or diet, or air, or exercise, or occupation, as agents or forces entitled to be called remedies. And yet he was treating of *Materia Medica* in its most extensive signification. Similar illustrations of the narrow limits, which were formerly imposed on *Materia Medica*, could be multiplied indefinitely.

In like manner, professors who taught the science, authoritatively, in the schools of Europe and this country, taught only drugs. Many of them were men of great attainments, to whom we are indebted for some of the richest acquisitions of medical science, and far be it from me to undervalue them or their labors, and yet they limited the *Materia Medica* to drugs; they experimented only with drugs; they

lectured only upon drugs. Medical students who listened to them, treasuring up the wealth that dropped from their lips, were indoctrinated with the notion, that skill and success in the management of disease would be in proportion to their knowledge of the properties and effects of drugs. Hence it came to be the case that physicians, generally, the world over, relied mostly, if not solely, on drugs in their treatment of disease. When they prescribed them, they supposed they were employing the best resources of medical art. When they spoke of treatment, they meant drugging. Gradually this prevalent teaching of the schools and practice of physicians led the public into the same way of thinking. Drugs formed the domestic *Materia Medica* of the world. They were the empiric's bait and the physician's resource.

It must not be forgotten, however, that there were physicians superior to this traditional teaching of the schools; men whose native genius or common sense made them incorporate into their *Materia Medica* other agents than drugs. But such men were exceptional. The catalogue of their names would not be long, and it would include the master minds of our profession, Hippocrates, Sydenham, Hunter and the like.

Such were the former boundaries of the *Materia Medica*. In its widest signification, it was limited to drugs. The professors of the schools observed these limits. Physicians kept religiously within them. Authors of elaborate treatises did not wander beyond them. The world accepted them as the orthodox limits of the science, and so *Materia Medica* was narrowed down to drugs; and treatment, to drugging.

Modern *Materia Medica* is not so narrow a science. It has a wider range, a larger horizon. It includes more agents than the druggist can pile up on his shelves, or the chemist torture in his laboratory. It comprehends drugs, and establishes their value and teaches their use, but it comprehends other agents also. It teaches that every influence, or agent, or force that can favorably modify disease or assist Nature's conservative action, is a remedy.

I will not ask you to accept this statement on my dictum merely. Let me give you some evidence of it. If you open the elaborate work of Dr. George B. Wood, on Therapeutics and Pharmacology, published ten years ago; or the still more elaborate work of Stillé, published four years ago; or if you read the medical journals of the

day, such, for example, as *Virchow's Archiv*, or the *Annales d'Hygiene*, or the *Bulletin de Thérapeutique*, you will learn that other agents than drugs enter into the *Materia Medica* of the present day. Dr. Wood, in the work just referred to, gives more than fifty pages to an account of Electricity as a remedial agent. He reckons and describes Heat as a stimulant. He treats of Cold, in the form of water, or air, or ice, as a diuretic, an anæsthetic, an astringent, a stimulant, a sedative and a tonic. He discusses and points out the value of the mind as a remedy, and shows how mental influences, like the sensations, emotions and passions, may be employed in therapeutics. Diet, food and water, climate and clothing, occupation and exercise, are described by him as a part of the *Materia Medica*. An intelligent American physician has given us an elaborate and valuable monograph on the physiological and therapeutical use of water. The treatises of Duchenne, Becquerel, Althaus and De la Rive, on Electricity, show how important a place that subtle and mysterious force holds in Therapeutics.

To show that varieties of diet have acquired an established position in our modern *Materia Medica*, I need only cite the recent works of Dr. Chambers, on Diet and Digestion; of Dr. Brinton, on Food; and the records of the invaluable labors, in this direction, of Virchow, Bidder and Schmidt, Bischoff, Bernard, Hammond and others. These observers have demonstrated, that the most rational and effectual method of treating certain forms of disease is to prescribe an appropriate diet, oleaginous, farinaceous, saccharine or otherwise, and thus have brought food within the strictest definition of the *Materia Medica*. Their observations show, moreover, what I fear is often neglected, or forgotten, or disbelieved, viz., that as much knowledge, experience and skill are requisite to prescribe and regulate an appropriate diet, as to administer quinine in a quotidian, or opium in colic, or iron in anæmia. Dr. Anstie, of London, in an excellent work on Stimulants and Narcotics, published this year, places food at the head of the list of stimulants. After it he puts opium, ammonia, alcohol, &c. He expresses himself thus with regard to it: "At the very head of this list it will be seen that I have placed food. I do so because if food can be digested, there is nothing which in so many cases relieves pain with satisfactory celerity, unless it be kept up by a mechanical cause. The action of all the other remedies in

the list is a pale reflex of that of highly nutrient and easily digested food."*

I have already alluded to the mind, or mental influence, as coming legitimately within the province of *Materia Medica*. The mind is a remedy. Our modern science claims it as a potent therapeutical agent. I have just stated that Dr. Wood classifies it with stimulants and sedatives. The work of Dr. Laycock, on *Mind and Brain, or Correlations of Consciousness*, is not only a curious and interesting inquiry into one of the most difficult departments of physiology, but it establishes the fact that the mind may cause and relieve pathological conditions; in other words, that the mind is a remedy, a part of the *Materia Medica*. The same fact is brought out by M. Lélut, in his work entitled *Physiologie de la Pensée*. A book by the late Sir Benjamin Brodie, on *Mind and Body*, indirectly illustrates the same thing. Feuchtersleben, a German writer, has written a monograph on the special point of the mind as a remedial agent. The journals of medicine for the last twenty-five years have contained numerous articles, from various authors, on the Will, or the Imagination, or the emotions, as agents that produce profound physiological effects; that *relieve*, as well as cause disease. The field is a new and unexplored one. Its investigation demands the utmost patience, judgment and acuteness; but the exploration has begun, and will go on.

I should weary your patience, were I to pursue this part of my subject farther. Enough has been said to show that the boundaries of *Materia Medica* have been greatly enlarged, and to point out the general direction of its growth. It is no longer limited to drugs. They are not excluded, but other agencies are added. It has become the complement of Theory and Practice, and the handmaid of Chemistry and Physiology in their most abstruse investigations. It provides the practitioner with whatever may be used to turn the currents of disease into favorable channels. It searches Nature everywhere to find its materials or agents. It lays hold of every substance, whether animal, vegetable or mineral, that can be tortured or coaxed into aiding the ailing body. It grasps every force that can render it any service, and calls it a remedy, whether it come from the heavens above, or the earth beneath, or the waters around the

* Stimulants and Narcotics. By Francis E. Anstie, M.D. Pp. 115.

earth, or from the soul within. Guided by a wise and patient observation, reverently following Nature's leading, it thus paves the way for rational therapeutics. With a range so extensive, with a signification so comprehensive, how different is the *Materia Medica* of to-day from that of the past, and from the common notion of it. Taken out from its ancient and narrow limits, it has become one of the most important and most interesting branches of human study.

Not only have the boundaries of the *Materia Medica* been thus enlarged, but the catalogue and character of drugs to which it was formerly confined have been greatly changed. Many worthless preparations have been discarded. A few new ones have been added. A more exact knowledge has been acquired of the chemical properties, the physiological action and the therapeutical value of those which have been retained, and which are now used. The progress which has been made in this direction is such as to warrant the belief, that Therapeutics will some time become a rational and exact science.

It is difficult to say whether it is more ludicrous, or sad to look back upon the superstitious charms, nauseous substances and absurd compounds, many of which the vulgar still cling to, that have encumbered the *Materia Medica*, and so obscured it, that wise men have doubted if there was anything of value in it. It is not two hundred years since treatises on *Materia Medica* described, and recommended as useful, substances as revolting as the hairs of a leper, the horns of a beetle, the blood and liver of a dog, the hoof and urine of an ass, the heart of a serpent, the saliva of a horse, the skin of a snake, the fæces of a cat, the blood and sweat and urine and ear-wax of human beings, the hearts of new-born children, spiders' bodies, dead men's hands, and murderers' gibbets. Shakspeare's witches may have taken their recipe from a contemporary *Materia Medica*, when they compounded for Macbeth their famous gruel of

"Eye of newt, and toe of frog,
Wool of bat, and tongue of dog,
Adder's fork, and blind-worm's sting,
Lizard's leg, and owlet's wing:
Liver of blaspheming Jew,
Gall of goat, and slips of yew,
Sliver'd in the moon's eclipse;
Nose of Turk, and Tartar's lips."

The British College formerly directed the following preparation for the benefit of the king's subjects. It was called *Aqua et Spiritus Lumbricorum Magistralis*, or water and spirit of earth-worms. The

original direction of the College reads thus :—" Take of Earth-worms well cleansed three pound, Snails with shells on their backs cleansed two Gallons, beat them in a Mortar, and put them into a convenient Vessel, adding stinking Nettles, Roots and all, six handfuls, wild Angelica four handfuls, Brank-Ursine seven handfuls, Agrimony, Betony, of each three handfuls, Rue one handful, common Wormwood two handfuls, Rosemary-flowers six ounces, Dock-roots ten ounces, the Roots of Sorrel five ounces, Turmerick, the inner bark of Barberries, of each four ounces; Fenugreek-seeds two ounces, Cloves powdered three ounces. Harts horn, Ivory in gross powder, of each four ounces; saffron three drams, small spirit of wine four Gallons and an half; after twenty-four hours infusion, distill them in an Alembick, Let the four first pounds be reserved for Spirit, the last for Water."

But we need not go back a century to find absurd and useless prescriptions and preparations. There are quarters where they still abound. Within a few years, I knew of a Boston physician who advised, and a Boston patient who wore, next the skin, for the relief of some pulmonary affection, a pork jacket. In a book published within the last decade or thereabouts, whose author belongs to a sect that claims to represent a peculiar advance in Therapeutics and *Materia Medica*, I have seen the directions for a preparation, intended for the treatment of what the learned call scabies, and the laity, itch, which consists of the infinitesimal dilution of a louse.

It is one of the signs of progress in *Materia Medica* that these and similar absurd preparations no longer deface our Pharmacopœia, or encumber our Dispensatories. They may be heard of in corners and holes where no light penetrates, and where superstition and credulity still find a congenial home, but they are no longer advised by educated physicians.

Another characteristic of modern *Materia Medica* is greater simplicity in the preparation of drugs. Preparations were formerly made from an indefinite number of articles. Instead of directing them from a single drug, or uniting it with one or two others, so as to meet some obvious indication, the authors of the older pharmacopœias, led by a fanciful theory, or metaphysical notion, or strange superstition, often prepared the most extraordinary compounds. Some of the ingredients might be valuable, but these were buried in such a mass of useless and often disgusting stuff, a few grains of

wheat in bushels of chaff, that it required a microscopic vision to detect the gold in the dross. Modern *Materia Medica* has retained all of these preparations that possess real merit, but has so curtailed their proportions, so winnowed them from the chaff, that they can scarcely be recognized in their modern attire. They are like noblemen, who can trace their ancestry back for centuries, and bear the name their fathers bore, but are so changed by modern civilization, that we can scarcely see in them, to-day, the blood which stirred the veins of their ancestors a thousand years ago. And yet it is there. Put them to the proof, and the old blood mounts to the forehead and sparkles in the eye. So in the *Materia Medica*, the useful part of a compound—the blood of the race—has descended from age to age, each century stripping off and throwing away more or less of the trappings that encumbered, and cerements that bound, and filth that buried it, till now, in the clearer light of to-day, its substantial value stands confessed. Such articles or compounds are of royal lineage. Every age, as it passes, re-asserts their value. Many of them boast an antiquity beyond that of the Herald's College. Thus some, like opium, trace their ancestry back to the sacred and shadowy mysteries of India and Egypt; others, like iron, to the classic mythologies of Greece and Rome; others, like nitrate of silver, to the glittering civilization and embryonic chemistry of Arabia and the East; and others, like antimony, to the mingled alchemy, superstition and empiricism of Europe's middle age. Many of them still bear the names which indicate their mystic origin and early use, but whose significance has passed away.

Open any of your works on *Materia Medica* at random, and you will scarcely fail to meet with an illustration of these remarks. Almost every one of the drugs they describe has gone through this process of change and simplification. Let me give you a single example.

There is a delightful and canonical compound of spices, which, under the name of *Spiritus Lavendulæ Compositus*, warmed the stomachs and cheered the hearts of our forefathers, two hundred years ago. A compound, with the same name, warms the stomachs and cheers the hearts of thousands to-day. The British College formerly ordered its preparation as follows:—"Take of Lavender-flowers one Gallon, to which pour three Gallons of the best Spirit of Wine, let them stand together in the Sun six days; then distil them with an Alembick with his refrigeratory.

"Take of the flowers of Sage, Rosemary and Betony of each one handful; the flowers of Borrage, Bugloss, Lillies of the Valley, Cowslips, of each two handfuls; let the flowers being newly and seasonably gathered, be infused in one gallon of the best Spirit of Wine, and mingled with the foregoing Spirits of Lavender-flowers, adding the leaves of Balm, Featherfew and Orange-tree fresh gathered, the flowers of Stœcha and Orange-tree, Barberries, of each, one ounce. After convenient digestion, distil it again, after which add Citron peels, the outward bark: Peony-seeds husked, of each six drams; Cinnamon, Mase, Nutmegs, Cardamons, Cubebs, yellow Sanders, of each half an ounce; wood of Aloes, one dram, the best Jubebs, the stones being taken out, half a Pound, digest them six Weeks, then strain it and filter it, and add to it prepared Pearls two drams, Emeralds prepared a scruple, Ambergreece, Musk, Saffron, of each half a scruple; red roses dried, red Sanders, of each half an ounce; yellow Sanders, Citron-peels dried, of each one dram; let the Species being tyed up in a Rag, be hung in the foregoing Spirits."*

Compare this extraordinary mixture—this farrago*—which, however, has had virtue enough in it to save it from oblivion, with the elegant composition which bears the same name now, and is the lineal descendant of the ancient one. The United States Pharmacopœia directs the Compound Spirits of Lavender to be prepared as follows:—

"Take of Oil of Lavender a fluidounce;
 Oil of Rosemary two fluidrachms;
 Cinnamon, in moderately fine powder, two troyounces;
 Cloves, in moderately fine powder, half a troyounce;
 Nutmeg, in moderately fine powder, a troyounce;
 Red Saunders, in moderately fine powder, three hundred
 and sixty grains;
 Alcohol six pints;
 Water two pints;
 Diluted Alcohol a sufficient quantity.

"Dissolve the Oils in the Alcohol, and add the Water. Then mix the powders, and, having moistened the mixture with a fluid-ounce of the alcoholic solution of the Oils, pack it firmly in a conical percolator, and gradually pour upon it the remainder of the alcoholic solution, and afterwards Diluted Alcohol, until the filtered liquid measures eight pints."

* Quoted from Culpepper's "Physician's Library," p. 124.

Here is a difference which marks two centuries of progress. Two hundred years have eliminated from this compound twenty-seven useless ingredients, and left eight useful ones. Do you call this a slow and tedious advance? Reflect, then, for a moment, and ask if any other science or art has done better. Has Law, or Politics, or Theology eliminated from any one of their formulas more than twenty-seven errors in two hundred years?

It is worthy of remark, in this connection, that we possess a much more exact knowledge of the properties of drugs than formerly existed. Chemistry, in this respect, has rendered to *Materia Medica* an infinite service. All important articles have been carefully analyzed. Their component parts or principles have been discovered, and many of these have been isolated and prepared for use. So that when a physician administers a certain drug he knows precisely what he is giving to his patient. He may prescribe it, in its natural state, for the purpose of giving all its active principles together; or he may administer one of them separately, or he may recombine them in proportions, different from their original conditions. Thus, when the Countess of Cinchon, in 1640, first took the bark which bears her name, and which his Holiness, Pope Innocent X., authoritatively pronounced not only "innocent but salutary," she swallowed a coarse powder, not unlike, in appearance and digestibility, the ground oak bark of our native forests, of whose active principles the physician of the Countess or of the Pope knew as little as he did of the properties of the magnet, or of the power of steam. Our present *Materia Medica* contains a minute and exact description of every principle, active or inactive, that exists in cinchona bark. Cinchona has been analyzed and examined over and over again, till our knowledge of it has become precise. When the Countess took her dose of bark, she swallowed at least a tablespoonful of a coarse and disagreeable powder. Should the failing health of his present Holiness require an equal amount of the same article, his physician would prescribe a delicate alkaloid, of which enough for a dose could be held on the blade of a penknife, and which in color and beauty would resemble the feathery crystals of the snow.

And here let me call your attention, for a moment, to the elegance which characterizes the preparations of our modern *Materia Medica*, as no small indication of its progress. Formerly, so much that was nauseous and disgusting was found in the *Materia Medica* of physi-

cians, that it seemed as if the therapeutic value of an article was measured by its filth, offensiveness and bulk. In what terms shall I describe an emetic, often given to his patients, as he himself told me, by a physician of this city, now dead—*requiescat in pace*—which was no unfair representative of the emetics of his time, and which consisted of 60 grains of calomel, and 60 grains of ipecac, and 60 grains of jalap, divided into three powders, of which one was to be taken every fifteen minutes. When we think of the pints of black draught that were swallowed, the quarts of bitters that were imbibed, the huge powders that were stuffed down, we are amazed at the powers of our ancestors' stomachs, and the unflinching courage of their souls. All this is changed. Pharmacy has become one of the fine arts. Pills are gilded now. Physic is so flavored that it charms the palate and woos the appetite. I do not speak of this change to ridicule or condemn it. Drugs will never be made delicious. They will never be sought as a gratification of the taste. But it is fortunate that they have been so extracted by chemistry, and prepared by pharmacy, that the sick chamber has lost one of its ancient terrors, the foul odor and taste of the drugs, that once were the whole and now are a part of medical treatment. Instead of the old infusion, there is the concentrated extract. Instead of the crude bark, we have the elegant alkaloid. Our ancestors gave liquids by the pint, and powders by the ounce. Their children give liquids of equal efficacy in fractions of an ounce, and powders in fractions of a grain. Simplicity in preparation, elegance in form, and energy in action characterize the drugs of the modern *Materia Medica*.

Within the last year a revised Pharmacopœia has been published in this country. A similar one has lately appeared in Great Britain. A comparison of these two works with similar ones published a century ago, will show how great the change is, which drugs have undergone. What experience has proved to be useful has been retained. What it has shown to be useless has been discarded. Whatever valuable agents empiricism has stumbled on, or botany discovered, or chemistry created, or physiology taught the use of, has been incorporated into these works. They are not perfect. The process of elimination and simplification might have been carried further. But enough has been done to render the last Pharmacopœias of the United States and Great Britain admirable representatives of our present knowledge of drugs, and a fair index of their place in the

therapeutics of the present century. On the one hand, their curtailed proportions show how much they have been pruned. On the other hand, the retention of many long-tried articles proves that there are drugs, whose value has been attested by the keenest criticism and the closest observation. Modern science neither ridicules nor discards drugs. It accords to them a substantial merit, and assigns to them an important though subordinate place in therapeutics. This of itself is no mean evidence of progress in *Materia Medica*.

After this imperfect comparison of the past and present boundaries of *Materia Medica*, and of the changes which drugs have undergone, we pass naturally to some account of the progress which has been made in studying the action of remedies, and ascertaining their therapeutic value.

This is the most important part of my subject; for it is precisely here that the greatest progress has been made. I can only allude to it in the briefest manner now. It will receive a larger development in the course of lectures upon which we are just entering.

Give me the methods of a science, says Cousin, and I will give you its results. If its methods are true, its results will be true. If its methods are false, its results will be false. No better illustration of this remark can be found than *Materia Medica* affords. Formerly, the method of studying remedies confounded two essentially different things; viz., the physiological and therapeutical action of remedies. Few, if any, attempts were made to ascertain their precise physiological action. They were administered only in pathological states, and consequently their effects were observed only in diseased conditions. Hence, almost inevitably, the phenomena of disease were confounded with, or taken for the action of remedies. The confusion which this produced was increased by another error of method. Diseases were so constantly interfered with by the experimental exhibition of drugs, that their natural course was not recognized. Here was a double error. Drugs, whose physiological action was unknown, were administered for the treatment of diseases, whose natural course and limitations were undiscovered. These errors of method led to the inextricable confusion and illogical statements, that may be traced all through the *Theory and Practice*, as well as the *Materia Medica* of the past.

Fortunately, in the progress of medical science, these uncertain and fallacious methods of investigation have been abandoned. The

necessity of adopting a juster method has been recognized. The extent of the change which has taken place, and of the progress which has been made in this respect, especially in *Materia Medica* and *Therapeutics*, during the last quarter of a century, can be estimated only by appreciating at their true value the results to which more scientific methods have led.

Our modern *Materia Medica* recognizes two conditions as the necessary basis of rational therapeutics. The first is an exact knowledge of the physiological action of remedies. The second is an equally exact knowledge of the natural history of diseases. Unless these two conditions are observed, *Therapeutics* in the future will be what they have been in the past—*empiricism*. These conditions are the sure and only possible foundation of scientific medicine. It has not yet been completely laid. We do not yet possess an exact knowledge of the physiological action of remedies, nor of the natural history of diseases. But we do know something with regard to them. Patient, earnest and intelligent workmen, the world over, are busy collecting the materials and laying the foundation. Little by little the materials are gathered, day by day progress is made, and so the work goes on.

Let us look, for a moment, a little more closely at these two conditions, or rather problems, for such they are at present. The attempt to solve them is a sign of progress. Their complete solution would place medicine among the exact sciences. *Materia Medica* is concerned chiefly with the first condition or problem; *Theory and Practice* with the second. *Therapeutics* embraces them both.

In studying the first, or the physiological action of remedies, observers of the present day are occupied with two distinct series of inquiry. One is an endeavor to trace the progress of an agent through the body, and the metamorphoses to which it is subjected, from its entrance to its complete elimination, without regard to the phenomena to which it gives rise in the system; the other is an endeavor to ascertain these phenomena, or the reaction of the system upon the agent as it passes through the body, in the order in which they are produced, and in the extent to which they go. These inquiries are of the most abstruse and complex character. They involve the highest degree of chemical and physiological knowledge. They require the nicest chemical manipulation, the most ingeniously devised and patiently conducted physiological experiments. But the science of to-day does

not shrink from the difficulty of the problem. It recognizes that difficulty, and has already accomplished enough to give assurance of complete success, by and by. An admirable illustration of this statement is to be found in the work of Briquet on Quinia. He has shown us precisely what is the course of quinia through the body. He has discovered how long quinia remains in the stomach, when it is introduced there; what the stomach does with it; how and when it gets into the blood; what the blood does with it; where the blood carries it to; when, and by what organs, and in what quantities and in what condition it is eliminated. So that if you give a man twenty grains of quinia, you can tell, if you know the recent researches of *Materia Medica*, what becomes of those twenty grains; you can tell how and in what condition they get into the body; you can trace them, however disguised, in all their hidden wanderings through the mysterious channels of the circulation and the recesses of the organization; you can see them in all their metamorphoses, and know when and how they escape. After thus ascertaining the progress of quinia through the system, Briquet took up the other part of the problem, and determined the physiological phenomena which quinia produces, from the period of absorption to that of elimination. He discovered how the tissues of the stomach acted, while the quinia sojourned there; how the albumen, fibrin, hæmatin and serum of the blood behaved in its presence; how the brain and nerve tissue were excited and depressed by it; what the heart said to it; how the spleen and liver liked it; and how gladly the kidneys expelled it. With this knowledge of its physiological action, Briquet next turned his attention to the therapeutical use and value of quinia. The former is the key to the latter. As soon as the behavior of quinia in the system was known, and the modifications which it impresses on the functions and composition of the organization were discovered, it was not difficult to ascertain the proper art of giving it, or to fix its therapeutical value. What Briquet has done for quinia, other observers have done, with greater or less success, for coffee, tea, opium, alcohol, mercury, &c. They are following the same methods of study, and thus the agents of the *Materia Medica* are subjected to a renewed and most patient investigation. The progress which is made is, from the nature of the case, slow, but it is a real one.

The attempt to solve the second problem that I have alluded to, or to ascertain the natural history of diseases, is also pushed vigor-

ously forward. Scientific physicians in Europe and this country, in Vienna, Paris and London, in New York, Boston and Philadelphia, are watching and noting the phenomena of disease, as carefully and patiently as astronomers watch the stars. And an equal success crowns, or will crown, the labors of each. For the present progress of medical science is the prophecy of its future attainment. It is no vain boast to say, that we can now read the signs of that coming time, when the physician shall know the orbit of a disease as accurately as the mathematician that of a planet.

Gentlemen, I have thus traced an imperfect sketch of the progress of *Materia Medica*. I have shown you that the evidences of its progress may be seen in its larger boundaries; in its juster appreciation of medicinal agents; and in its truer methods of study. Let us not forget that the progress which signalizes the *Materia Medica* and Therapeutics of the nineteenth century, also characterizes every other department of medical science. Anatomy, Physiology, Pathology and all the collateral branches of medicine join with no lag-gard or faltering step in the majestic progress with which all science and art move on. You have come to this University to-day for the purpose of commencing or pursuing the study of a living and progressive science—not of a dead or stagnant one. Here you will not dissect the dried bones, or explore the fossilized dogmas of the past, but learn the sacred mysteries—the living truths, which, however old, are always new, and which Nature ever more and more liberally reveals to her faithful disciples. May you come to your work with the consecration of an earnest purpose, and follow it by the light of a lofty ideal. For you cannot over-estimate the nobility of medical science. Its field of study is God's noblest creation—man; its inspiration is man's divinest motive, the love of truth; its object, worthy of Omnipotence, is the relief of a suffering race.

